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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/800,477	03/08/2001	Thomas Dodt	P20466	4933

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EXAMINER	
JOHNSTONE, ADRIENNE C	
ART UNIT	PAPER NUMBER
1733	

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Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Office Action Summary	Application No. 09/800,477	Applicant(s) DODT ET AL.	
	Examiner Adrienne C. Johnstone	Art Unit 1733	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 07 October 2003.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-21 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-3 and 6-21 is/are rejected.

7)☒ Claim(s) 4 and 5 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .

4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: .

DETAILED ACTION

Response to Arguments

1. In view of the appeal brief filed on October 7, 2003, PROSECUTION IS HEREBY REOPENED. New grounds of rejection are set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) request reinstatement of the appeal.

If reinstatement of the appeal is requested, such request must be accompanied by a supplemental appeal brief, but no new amendments, affidavits (37 CFR 1.130, 1.131 or 1.132) or other evidence are permitted. See 37 CFR 1.193(b)(2).

Specification

2. The added subject matter filed in this continuing application which is not supported by the original disclosure in the parent application is objected to under 35 U.S.C. 132 because it introduces new matter into the disclosure. 35 U.S.C. 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: the new language in paragraphs 0029, 0031, and 0033-0035 is not supported by the original disclosure (parent application as originally filed).

Applicant is required to cancel the new matter in the reply to this Office Action.

This objection is made for the same reasons as set forth in paragraph 1 of the Office action mailed July 17, 2002 (Paper Number 3). Applicants argue that the added subject matter corresponds to the claims filed in this application, but because this application is a <u>continuation</u> of parent application 08/955,920 the original disclosure is the parent application as originally

filed and not this application as originally filed (MPEP 608.04(b): the changes to the parent application disclosure as originally filed constitute a preliminary amendment which does not form part of the original disclosure in this continuation application). Applicants' other arguments are addressed in the 35 U.S.C. 112 first paragraph rejections of claims 1-3 and 6-21 below.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-3 and 6-21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

a) Applicants argued in the remarks accompanying the amendment filed October 10, 2002 and continue to argue that the instant claim 1 language requiring the sound-absorbing insert to be "coupled to" an acoustically transparent support element "comprising at least one layer of fibers oriented in a circumferential direction" includes the embodiment wherein the support element is provided as *fibers that are distributed preferably uniformly in the sound-absorbing insert and oriented predominately in the circumferential direction of the tire* (specification paragraphs 0016, 0025-0026, and 0071-0072 and parent specification p. 4 lines 9-12, p. 6 lines 1-13, and p. 11 lines 11-30). Specifically, Applicants alleged and continue to allege that the above-noted embodiment supports the instant claim 1 language. While applicant may be his or her own lexicographer, a term in a claim may not be given a meaning repugnant to the usual meaning of that term. See *In re Hill*, 161 F.2d 367, 73 USPQ 482 (CCPA 1947). The terms "layer of fibers" and "coupled to" in claim 1 are therefore used by the claim in view of applicants' arguments to

mean "a group of fibers" and "forming part of," while the accepted meanings are "a single thickness or stratum of fibers" and "joined, linked, or connected to"; in the above-noted embodiment the fibers distributed inside the sound-absorbing insert are clearly not segregated into single thicknesses or strata of fibers and are not a distinct entity joined, linked, or connected to the sound-absorbing insert.

Applicants' new arguments concerning the definitions of the terms in question are directed only to the woven mesh embodiment and therefore do not adress the above-noted issue concerning the embodiment wherein the support element is provided as *fibers that are distributed preferably uniformly in the sound-absorbing insert and oriented predominately in the circumferential direction of the tire.* One way to overcome this rejection would be to confirm on the record that the instant claim 1 language is NOT supported by the embodiment wherein the support element is provided as *fibers that are distributed preferably uniformly in the sound-absorbing insert and oriented predominately in the circumferential direction of the tire.*

b) The term "foil" (very thin layer) as recited in instant claim 6 is a relative term which renders the claim indefinite (the claim is now without the requirement that the foil somehow include a layer of fibers, which effectively set the thickness of the "foil" to be the same as the the thickness of the layer of fibers). The required thickness of the "foil" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

Applicants now argue that the term "foil" is defined in Webster's II New College Dictionary as "a thin flexible sheet of metal" and that the recited foil has a conventional foil thickness, however this definition cannot be applied in the instant application because it contradicts applicants' preferred embodiment wherein the perforated foil is made of *synthetic* material (specification paragraph 0061). One of ordinary skill in the art would therefore

understand a "foil" in this context to generally mean a very thin layer of material as noted above but would not know the required thickness range for such a general definition. Applicants' preferred embodiment wherein the perforated foil is made of synthetic material would be understood by one of ordinary skill in the art to be a synthetic film, defined as a planar form of plastic having a thickness of up to 0.25 mm depending on the particular intended use of the film (see for example *Encyclopedia of Polymer Science and Engineering*, Volume 7, p. 73); one way to overcome this rejection would be to change the term "perforated foil" to -- perforated synthetic film, defined as a perforated layer of plastic material having a thickness of up to 0.25 mm, -- in claim 6 and amend the first line of specification paragraph 0061 such that "in particular consisting of synthetic material" is changed to -- in particular a perforated synthetic film, defined as a perforated layer of plastic material having a thickness of up to 0.25 mm -- .

c) The claim 7 limitation that the perforated foil is isotropic directly contradicts claim 6 as amended, which requires the perforated foil to be "oriented in the circumferential direction": the material forming the foil itself (e. g., polymer chain structure) cannot be both isotropic and "oriented" (isotropic foil = foil having same material properties in all directions).

It appears from applicants' arguments that applicants intend the perforated foil to be -- extending -- in the circumferential direction rather than be "oriented" in the circumferential direction (contrary to applicants arguments, one of ordinary skill in the art would attribute the art-specific definition to the term "oriented", meaning the structure of the material itself such as polymer chain structure has a particular orientation: see for example *Engineering Materials Properties and Selection*, pp. 48 and 49); one way to overcome this rejection would be to change "oriented" to -- extending -- in claim 6 lines 8 and 10.

d) Applicants now argue that the parent application original disclosure recites the claim 10 language requiring the wrapped strip of sound-absorbing material to have "at least one side"

coupled to the acoustically transparent support element, however this is not true when the claim is interpreted *in light of the specification*: specification paragraph 0067 and parent specification p. 10 lines 12-13 clearly require the acoustically transparent support element to be coupled to the strip on at least *the radially outer side* (one of ordinary skill in the art would understand the recitation that the only one side "should be the outer side in the radial direction in the wrapped state" to require the side to be the radially outer side contrary to applicants' arguments).

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 1-3 and 6-21 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. This is a new matter rejection.

A. <u>There is no literal support in the parent application original disclosure for the instant claim 1 language</u>.

Applicants have literal support in the parent application for the following:

1) the generic language describing the sound-absorbing insert provided with an acoustically transparent support element exhibiting tensile strength in at least the circumferential direction (specification paragraph 0011 and parent specification p. 3 lines 9-11);

2) the alternative generic language describing the sound-absorbing insert as open-cell foamed material whose pores are oriented predominately in the circumferential direction to provide the insert with tensile strength in the circumferential direction

(specification paragraphs 0012-0014, 0024, and 0070 and parent specification p. 3 lines 13-27, p. 5 lines 24-30, and p. 10 line 27 - p. 11 line 9)

3) the subgeneric language describing the sound-absorbing insert provided with an acoustically transparent support element exhibiting tensile strength in at least the circumferential direction (specification paragraph 0011 and parent specification p. 3 lines 9-11) including wrapping the support element over the surface of the sound-absorbing insert that is open to the tire interior such that it covers at least a portion of the insert cross-section (specification paragraph 0015 and parent specification p. 3 line 29 - p. 4 line 1);

4) the alternative subgeneric language describing the sound-absorbing insert provided with an acoustically transparent support element exhibiting tensile strength in at least the circumferential direction (specification paragraph 0011 and parent specification p. 3 lines 9-11) including [layers of] the support element placed at discrete radial distances from each other in the sound-absorbing insert (specification paragraph 0016 and parent specification p. 4 lines 4-9) such as by forming the insert from a ring-shaped strip of sound-absorbing material that is looped around the rim several times, the support element attached to at least the outer side of the strip such that each layer of the strip also contains a support element layer (specification paragraphs 0020-0021 and 0064-0067 and parent specification p. 4 line 29 - p. 5 line 6 and p. 9 line 25 - p. 10 line 13);

5) the species wherein in the sound-absorbing insert provided with an acoustically transparent support element exhibiting tensile strength in at least the circumferential direction (specification paragraph 0011 and parent specification p. 3 lines 9-11) the support element is provided as *fibers that are distributed preferably uniformly in the sound-absorbing insert and oriented predominately in the circumferential direction of the*

tire (specification paragraphs 0016, 0025-0026, and 0071-0072 and parent specification p. 4 lines 9-12, p. 6 lines 1-13, and p. 11 lines 11-30) which therefore is covered by neither instance of subgeneric language (the fibers preferably uniformly distributed inside the insert are neither wrapped over the surface of the sound-absorbing insert that is open to the tire interior such that it covers at least a portion of the insert cross-section nor placed in layers at discrete radial distances from each other in the sound-absorbing insert);

6) the species wherein in the sound-absorbing insert provided with an acoustically transparent support element exhibiting tensile strength in at least the circumferential direction (specification paragraph 0011 and parent specification p. 3 lines 9-11) the support element is provided as *a woven mesh* (specification paragraphs 0017, 0053-0060, and 0065 and parent specification p. 4 lines 14-18, p. 7 line 25 - p. 9 line 7, and p. 10 lines 1-7) covered by both instances of subgeneric language (the woven mesh can be either wrapped over the surface of the sound-absorbing insert that is open to the tire interior such that it covers at least a portion of the insert cross-section or placed in layers at discrete radial distances from each other in the sound-absorbing insert); and

7) the species wherein in the sound-absorbing insert provided with an acoustically transparent support element exhibiting tensile strength in at least the circumferential direction (specification paragraph 0011 and parent specification p. 3 lines 9-11) the support element is provided as *a perforated foil* (specification paragraphs 0018, 0061, and 0065 and parent specification p. 4 lines 20-23, p. 9 lines 9-14, and p. 10 lines 1-7) covered by both instances of subgeneric language (the perforated foil can be either wrapped over the surface of the sound-absorbing insert that is open to the tire interior such that it covers at least a portion of the insert cross-section or placed in layers at discrete radial distances from each other in the sound-absorbing insert).

By contrast, the subgenus language of instant claim 1 requires the sound-absorbing insert to be "coupled to" an acoustically transparent support element "comprising at least one layer of fibers oriented in a circumferential direction" which clearly does not have literal support in the parent application original disclosure: the presence of dependent claims 4 and 5 directed to the woven mesh support element makes clear that the instant claim 1 language encompasses something more than just the originally disclosed woven mesh (otherwise these claims would not further limit claim 1). Note that applicants' arguments mischaracterize the examiner's position as requiring literal support for the claim 1 subject matter, which is clearly not the examiner's position in view of part B below.

B. <u>There is no inherent support in the parent application original disclosure for the instant claim 1 language</u>.

Applicants argue that the subgenus language of instant claim 1 requiring the sound-absorbing insert to be "coupled to" an acoustically transparent support element "comprising at least one layer of fibers oriented in a circumferential direction" is inherently disclosed because the general importance of tensile strength in the circumferential direction of the insert is disclosed and the woven mesh species is disclosed, however this is not the case here because:

1) The test for compliance with the written description requirement of 35 U.S.C. 112 first paragraph is not what would have been *obvious* to one of ordinary skill in the art but what is expressly or inherently *disclosed*. See, e.g., *Lockwood v. American Airlines Inc.*, 41 USPQ2d 1961, 1966 (CAFC 1997)("Entitlement to a filing date does not extend to subject matter which is not disclosed, but would be obvious over what is expressly disclosed. It extends only to that which is disclosed. ... The question is not whether a claimed invention is an obvious variant of that which is disclosed in the specification. Rather, a prior application itself must describe an invention, and do so in sufficient detail that one skilled in the art can clearly conclude that the

inventor invented the claimed invention as of the filing date sought. ... A description which renders obvious the invention for which an earlier filing date is sought is not sufficient.") and *In re Barker and Pehl*, 194 USPQ 470, 474 (CCPA 1977) quoting *In re Winkhaus, Tusche, and Kampf*, 188 USPQ 129, 131 ("That a person skilled in the art might realize from reading the disclosure that such a step is *possible* is not a sufficient indication to that person that that step is part of appellant's invention.").

2) The parent application original disclosure does not include a *representative number* of specific support element embodiments to adequately describe the new subgenus language of instant claim 1 requiring the sound-absorbing insert to be "coupled to" an acoustically transparent support element "comprising at least one layer of fibers oriented in a circumferential direction". See, e.g., *University of California v. Eli Lilly and Co.*, 43 USPQ2d 1398, 1406.

a) The presence of dependent claims 4 and 5 directed to the woven mesh support element makes clear that the instant claim 1 language encompasses something more than just the originally disclosed woven mesh (otherwise these claims would not further limit claim 1).

b) The only one of the originally disclosed support element examples noted above containing any fibers *in a distinct layer* (as opposed to the short fibers uniformly distributed in the insert material itself, specification paragraphs 0016, 0025-0026, and 0071-0072 and parent specification p. 4 lines 9-12, p. 6 lines 1-13, and p. 11 lines 11-30) is the specific woven mesh support element (specification paragraphs 0017, 0053-0060, and 0065 and parent specification p. 4 lines 14-18, p. 7 line 25 - p. 9 line 7, and p. 10 lines 1-7).

c) The originally disclosed generic language describing the sound-absorbing insert provided with an acoustically transparent support element exhibiting tensile strength in at least the circumferential direction (specification paragraph 0011 and parent

specification p. 3 lines 9-11) in combination with the originally disclosed embodiment wherein the support element is in the form of a woven mesh (specification paragraphs 0017, 0053-0060, and 0065 and parent specification p. 4 lines 14-18, p. 7 line 25 - p. 9 line 7, and p. 10 lines 1-7) does not adequately describe the particular subgenus of support elements "comprising at least one layer of fibers oriented in a circumferential direction" "coupled to" the sound-absorbing insert for purposes of compliance with the written description requirement of 35 U.S.C. 112 first paragraph because there is no indication in the parent application original disclosure that applicants considered the subgenus structure to be the only characteristic of the woven mesh important in achieving circumferential tensile strength (for example, it may very well be at least as important that the woven mesh has fibers extending around the *entire circumference* of the insert and/or transverse fibers linking together the circumferential fibers in order to provide the requisite degree of tensile strength to the insert) and there are no other originally disclosed support element embodiments sharing the subgenus characteristics that would suggest that applicants were in possession of that subgenus at the time of filing of the parent application. See, e.g., *In re Smith*, 173 USPQ 679, 683-684 (CCPA 1972)(generic disclosure plus species with at least 12 carbon atoms did not support subgenus of at least 8 carbon atoms) and *In re Lukach, Olson, and Spurlin*, 169 USPQ 795, 797 (generic disclosure of small molecular weight ratio plus species of molecular weight ratio 2.6 did not support molecular weight ratio 2.0-3.0). This is especially true in view of applicants' statement that "A series of possibilities exist for concrete embodiments of the support elements" (specification paragraph 0017 and parent specification p. 4 line 14), the specific nonfibrous perforated foil support element embodiment (specification paragraphs 0018, 0061, and 0065 and parent specification p. 4 lines 20-23, p. 9 lines 9-14, and p. 10 lines 1-

7), and the virtually unlimited and *unpredictable* number of possible support element materials and constructions generically having tensile strength in at least the circumferential direction, including material whose microstructure has been chemically or physically modified to produce the requisite degree of tensile strength in the circumferential direction.

C. <u>There is no literal or inherent support in the parent application original disclosure for the instant claim 6 language</u>.

Applicants recite in claim 6 as amended that the perforated foil is "oriented in a circumferential direction," which is clearly not supported by the parent application original disclosure: the perforated foil has tensile strength in the circumferential direction but the material forming the foil itself (e. g., polymer chain structure) is not disclosed to be "oriented". This is especially true in view of applicants' preferred embodiment of an *isotropic* perforated foil (isotropic foil = foil having same material properties in all directions). See paragraph 4 part c: it appears from applicants' arguments that applicants intend the perforated foil to be -- extending -- in the circumferential direction rather than be "oriented" in the circumferential direction (contrary to applicants arguments, one of ordinary skill in the art would attribute the art-specific definition to the term "oriented", meaning the structure of the material itself such as polymer chain structure has a particular orientation: see for example *Engineering Materials Properties and Selection,* pp. 48 and 49); one way to overcome this rejection would be to change "oriented" to -- extending -- in claim 6 lines 8 and 10.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 6 and 7 are rejected under 35 U.S.C. 102(b) as being anticipated by European Patent Application 0 663 306 A2 cited by applicants.

See the translation p. 9 line 1 - p. 11 line 10, embodiment of Figure 2: sound-absorbing filler material housed in perforated bicycle inner tube or tire inner tube. It should be noted that the instant claim term "perforated foil" does not distinguish over the EP '306 perforated bicycle inner tube due to the indefinite nature of the term "foil" as discussed in paragraph 4 part b above. As to claim 7, the distribution of the perforations can be regular (p. 10 last line) and one of ordinary skill in the art would have understood the inner tube material itself to be isotropic unless otherwise specified, resulting in an isotropic inner tube.

Allowable Subject Matter

9. Claims 4 and 5 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. Once the 35 U.S.C. 112 rejections of claims 6 and 7 are overcome as suggested by the examiner, claims 6 and 7 would receive favorable consideration because the prior art of record does not disclose or suggest providing the perforated bicycle inner tube or tire inner tube of EP '306 in the form of a perforated synthetic film, defined as a perforated layer of plastic material having a thickness of up to 0.25 mm.

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Adrienne C. Johnstone whose telephone number is (571)272-1218. The examiner can normally be reached on Monday-Friday, 10:00AM-6:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Crispino can be reached on (571)272-1226. The fax phone numbers for the organization where this application or proceeding is assigned are (703)872-9311 for regular communications and (703)872-9310 for After Final communications.

Adrienne C. Johnstone
Primary Examiner
Art Unit 1733

Adrienne Johnstone
July 20, 2004

Adrienne C. Johnstone

Notice of References Cited	Application/Control No. 09/800,477	Applicant(s)/Patent Under Reexamination DODT ET AL.	
	Examiner Adrienne C. Johnstone	Art Unit 1733	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-			
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	English translation of European Patent Application 0 663 306 A2, July 19, 1995.
	V	ENCYCLOPEDIA OF POLYMER SCIENCE AND ENGINEERING, vol. 7, John Wiley & Sons, 1987, p. 73.
	W	ENGINEERING MATERIALS PROPERTIES AND SELECTION, Kenneth Budinski, Reston Publishing Company, Inc., 1983, pp. 48 and 49.
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

PTO 04-0378

German Patent

Document No. 0 663 306 A2

MOTOR VEHICLE WHEEL

[Kraftfahrzeugrad]

Thomas Dodt et al

UNITED STATES PATENT AND TRADEMARK OFFICE

Washington, D.C. October 2003

Translated by: Schreiber Translations, Inc.

Country	:	Europe, based on a German application
Document No.	:	0 663 306 A2
Document Type	:	Publication of application with search report
Language	:	German
Inventor	:	Thomas Dodt and Frank Gauterin
Applicant	:	Continental Aktiengesellschaft, Hanover, Federal Republic of Germany
IPC	:	B 60 C 19/00
Application Date	:	January 11, 1995
Publication Date	:	July 19, 1995
Foreign Language Title	:	Kraftfahrzeugrad
English Title	:	**MOTOR VEHICLE WHEEL**

/1[1]

Motor Vehicle Wheel

The invention concerns a motor vehicle wheel having a tire mounted on a rim (1). A tube (5, 6, 7, 9, 10, 12), which is filled at least partially with sound-absorbing material but is overall still flexible, is mounted on the rim (1).

/2

The invention concerns a motor vehicle wheel having a tire mounted on a rim.

The noise caused by street traffic is one of the most disturbing sources of noise. The causes of the noise of motor vehicles are the engine and the wheels, of which the noise produced by the wheels/roadway is predominant on highways and paved roads as well as under wet conditions. With the increasing number of sound-absorbing materials for engine encapsulations, the noise produced by the wheels/roadway has become more and more the dominant source of noise.

It is known that wheel vibrations produced during the rolling of a tire are one of the main origins of the propagation of noise. These tire vibrations do not only radiate noise to the environment, but in the same way the sound is also emitted

[1] Numbers in the margin indicate pagination in the foreign text.

into the toroidal chamber of the tire. Because of the improved impedance conditions, the acoustic power transmitted within the tire torus is about three times greater and generates therein noise levels of up to 140 dB. Part of this noise escapes to the outside through the side walls.

The vibrations initiated in the tire toroidal chamber are dependent from the respective excitation mechanism, wherein here in particular not only the vehicle speed and the structure of the profile of the running strip, but also the structure of the roadway play an important part. The forced vibrations are superimposed in addition with the vibrations caused by the tire structure, wherein in this respect in particular the construction and the material of the belt, the profile structure, and also the mixed composition have an influence on the running strip and on the side wall as well as on the other tire components. The vibrations transmitted in the toroidal chamber have in truck tires a maximum within the frequency range of 300 to 1,300 Hz, in automobile tires within the frequency range of 500 to 2,000 Hz. In addition, there are natural vibrations of the air column located in the toroidal chamber, whose natural frequencies depend from the geometric measurements of the toroidal chamber. The first peripheral natural frequency lies, for example, in automobile tires around 250 Hz and in

truck tires around 150 Hz; the first axial vibration mode lies in automobile tires within the range of 500 to 1000 Hz and in truck tires within the range of 300 to 700 Hz. Further vibration modes occur at integral multiples of the base frequency.

All the sound vibrations occurring in the toroidal chambers of tires are radiated outward in part via the side walls or are transmitted into the interior of the vehicle via the vehicle parts.

It is known that sound-absorbing material reduces the acoustic power transmitted in the tire torus. A realization failed until now because there was no technical solution for a simple installation and removal of tires and insulating material.

Here intervenes the invention, whose object consists in achieving an effective reduction of the sound waves forming in the toroidal chamber, with a particular emphasis on simple installation and removal possibilities.

The object is attained in accordance with the invention by mounting a tube on a rim, which is at least partially filled with sound-absorbing material, but is overall still flexible.

By means of this inventive measure can be realized an effective sound reduction or sound absorption within the

toroidal chamber of a tire. By matching the tube and the sound-absorbing material in its internal space with the respective tire can be noticeably reduced the outward sound emission as well as the sound transmission into the interior of the vehicle. Since the tube is not a rigid element, it can be installed and removed without problems together with the tire.

Further preferred embodiments of the invention are contained in the dependent claims.

A rubber tube, in particular, is considered due to its elasticity as tube in accordance with a preferred embodiment of the invention.

To ensure the smooth running of the tires it is also advantageous if the tube is dimensioned in such a way that it is fixed on the drop center of the rim.

From the point of view of its size or its diameter, the tube is configured in such a way that it fills out a part of the volume of the tire internal space that is as large as possible, in particular up to a third thereof, and it does not come into contact with the inner wall of the tire during the driving operation.

According to a preferred embodiment of the invention, the sound-absorbing material is a loose material, for example, foam flakes, foam particles, cotton, wool, foam rubber, or the like.

In this way, the tube remains not only overall flexible, but the sound-absorbing characteristics of this filling material can also be exploited.

In another embodiment of the invention, the sound-absorbing material is a material that is cohesive, for example, a foam material.

For a further influencing of the sound-absorbing material, it is advantageous if the sound-absorbing material is configured in such a way or is arranged in such a way within the tube, that its acoustic properties change continuously or discontinuously along one of its geometric expanses.

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It has been found out to be particularly advantageous if the tube is provided with a multitude of holes. Thereby, the sound absorption properties can, on the one hand, be increased and, on the other hand, be better adjusted to the respective tire.

These holes can be irregularly or regularly distributed in the tube, and can be provided with different diameters for a further influencing of the sound absorption properties.

Depending on the desired noise absorption properties, the hole surface proportion within the tube can be selected between 5 and 80%, in particular between 10 and 50%.

In another advantageous embodiment of the invention, a ring of sound-absorbing material can be arranged in the internal space of the tube provided with holes, which together with the tube rests on the drop center of the rim and whose outer diameter is less than the diameter of the tube. By means of this arrangement is adjusted the principle of a perforated plate resonator, which clearly improves the absorption of the sound waves in a broadband frequency range.

In another advantageous embodiment variation, the tube is provided with a multitude of naps having different heights. This measure makes it possible to realize broadband attuned lambda/4-resonators.

Another variation of the invention consists in that the tube encases in its internal space a tube-shaped element made of sound-absorbing material, in particular foam material, and this tube-shaped element rests on the inner wall area of the tube. In the internal space of the tube-shaped element is located thus an additional resonance space.

In a further embodiment of the invention, the tube filled with the continuous insulating material is provided with a multitude of holes, which continue as hollow spaces in the filling material. In this way are formed additional resonators in a simple way.

In a preferred embodiment, the holes in the filling material, which are configured in the tube with preferably different diameters, continue as cylindrical hollow spaces.

Helmholtz resonators can be formed by configuring hollow spaces in the filling material, which form in particular differently dimensioned resonator hollow spaces, wherein the holes in the tube form the resonator necks.

To be able to create broadband active Helmholtz resonators, these hollow spaces can be configured in the insulating material in the shape of a cone or truncated cone. A broadband noise absorption is also then obtainable if insulating wedges are configured within the filling material, while the tube is provided with correspondingly adapted holes.

Further features, advantages and details of the invention will be explained in more detail below in view of the drawings, which contain several exemplary embodiments in schematic representation. Figs. 1 to 6 of the drawings show respectively a cross section through a tire, which is mounted on a rim, and respective sections of different exemplary embodiments of sound-absorbing tubes, and Figs. 6a to 6d show variations of the embodiment of Fig. 6. Fig. 7 shows frequency spectra of a truck tire, which depict the effect of sound-absorbing tubes.

In Figs. 1 to 6 are depicted a conventional rim 1 for a truck tire having a drop center 2 and rim edges 3 and a schematic cross section of a tire 4 seated on this rim 1. However, the invention is not limited to a truck tire; the invention described below can be likewise applied to automobile tires and automobile tire rims.

As shown in Fig. 1, the a tube 5 is mounted over or on the drop center 2 of the rim 1 over the entire periphery of the rim 1. The tube 5 is configured, in particular, as a rubber tube, which is configured similarly to a bicycle tube or a tire inner tube, and can correspond in particular with respect to wall thickness, surface weight, and elasticity to such a bicycle or tire inner tube. The tube 5 is filled with a sound-absorbing material, wherein foam flakes, foam particles, cotton, wool, etc., for example, can be taken into consideration as filling material. The selection of the filling material is to be coordinated with the desired sound absorption properties, which depend from the respective tire, to ensure a sound absorption for the frequency range utilized respectively for consideration.

The tube 5 is completely filled, but only so much that it remains overall flexible, so that it can be pulled over the rim edge for installation and removal. The measurements of the tube as well as its elasticity should be calibrated in such a way

that, on the one hand, an installation is possible without problems and, on the other hand, after completing the installation, a firm seat in the drop center 2 of the rim 1 is ensured. The filling material and the tube 5 are also adjusted with respect to each other in such a way that by way of the centrifugal force during the rolling of the tire, the tube 5 remains seated in the rim 1. The tube 5 is configured in such a way from the point of view of its size or its diameter that it fills out the largest possible

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part, in particular up to one third, of the volume of the tire internal space, and it does no longer come into contact with the inner wall of the loaded tire. This applies also as the already described data on the material and other properties of the tube 5 for all the exemplary embodiments.

In Fig. 2 is shown another embodiment variation in which the tube 6, which is filled as the tube 5 in the exemplary embodiment of Fig. 1 with a corresponding insulating material, is provided with a multitude of holes 6a, which completely pierce the tube wall. The holes 6a have preferably a circular cross section, but can also be provided with any other cross section, the diameter of the holes is selected between 2 and 20 mm, their distribution on the tube 6 can be regular or irregular

and can be adjustable in particular transversely to the peripheral direction. The hole surface proportion over the entire surface of the tube 6 is dependent from the material of the tube as well as from the filling material, and will amount in general to between 5 and 80%, in particular 10 to 50%. The diameter, distribution and hole surface proportion as well as the sound absorption properties of the filling material are adjusted with respect to the respective tires so as to optimize the sound absorption in the respective essential frequency range.

Fig. 3 shows an embodiment variation in which the tube 7 provided with holes 7a, which is similar or analog to the one of Fig. 2, is provided, in whose internal space is located a tube rubber ring 8, which is proportioned from the inner diameter in such a way that it rests together with the tube 7 in the drop center 2 of the rim 1. The outer diameter of the ring 8 is smaller than the diameter of the tube 7, so that a hollow space remains between the ring 8 and the tube 7. A hollow space can be created moreover by a corresponding cross sectional configuration of the ring 8, whose distance to the inner wall of the tube 7 varies transversely to the peripheral direction. This hollow space fills up with air due to the centrifugal force while the tire rolls, so that the selected distance is set. The

principle of a perforated plate resonator is adjusted by means of this arrangement, which increases the absorption of the sound waves in a broadband frequency range.

The tube 9 shown in Fig. 4, which is also filled with insulating material like those described above, is provided with a multitude of naps 9a. The naps 9a have different heights a, which are dimensioned in such a way that are realized lambda/4-resonators in this way, which are attuned to broadband. Thus, for a sound wave of 1000 Hz is required a nap height a of, for example, 7.5 cm. The naps 9a can be provided in addition with holes 9b for a further improvement of the sound absorption.

In the exemplary embodiment shown in Fig. 5, the tube 10 encloses an inner hollow tube element 11 of sound-absorbing material, for example, foam material. The tube element 11 rests on the inner wall area of the tube 10 and can be fixedly connected to the inner wall of the tube 10, for example, by gluing, so that an additional resonance space is thus located in the internal space of the tube element 11.

In the exemplary embodiment shown in Fig. 6 is provided a tube 12, which is completely filled with an insulating material 13 that is cohesive and correspondingly molded. The tube 12 can be foamed. The tube 12 is, in turn, provided with a multitude of holes 12a, which continue as hollow spaces also in the

insulating material 13, so that different types of resonators are formed. Possible different embodiment variations are shown in the Figs. 6a to 6b.

Fig. 6a shows a configuration with perforated resonators. The holes 12a configured in the tube 12 preferably with different diameters continue into the insulating material 13 as differently dimensioned cylindrical hollow spaces 13a.

In Fig. 6b is shown a configuration with which are formed Helmholtz resonators. The holes 12b in the tube 12 form the resonator necks, the hollow spaces 13b in the insulating material form the resonator hollow spaces. The hollow spaces 13b and/or the holes 12b are also here differently dimensioned.

Fig. 6c shows an embodiment variation with broadband active Helmholtz resonators. Just like in the embodiment of Fig. 6b, holes 12c, which represent the resonator necks, are configured in the tube 12; in the insulating material are configured hollow spaces 13c, which are configured in truncated cone shape.

Fig. 6d finally shows an embodiment variation in which by means of the recreation of the insulating wedges are realized lambda/4-resonators. The insulating wedges 13d are shaped in the insulating material, the tube 12 has openings 12d having a matching width.

In the embodiment variation according to Figs. 6a to 6d, the measurements of the holes in the tube, the hollow spaces of the resonator in the insulating material or in the insulating wedges are adjusted to the desired sound absorption. It is self-evident that these measurement, on the one hand, can be selected to be different in an individual tube, and also that the depicted and described embodiment variations can be combined with one another in one and the same tube.

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Fig. 7 shows frequency spectra of a truck tire, which are determined in the near field of a tire running on a drum test bed. A frequency spectrum was determined at the same time for each tire without the tube of the invention, with a tube in the embodiment of Fig. 1, and with a tube in the embodiment of Fig. 2. It is clear to see that in the two embodiments of the invention takes place a clear reduction of the sound pressure level.

It is generally applicable that the different variations described with reference to the individual figures of the drawings can be combined with one another in any desired way. It is also generally applicable that the acoustic properties of the used material can change continuously or discontinuously along their geometric expanse.

The sound-absorbing material in loose form, that is, for example, foam particles, foam flakes, and the like, can be introduced through an opening in the tube, which is then closed again after filling, for example, by gluing.

In the sound-absorbing material configured in the shape of a ring, it is possible to fold the tube that is open over its periphery over the material and to again close the same, for example, by gluing.

Patent Claims

1. A motor vehicle wheel having a tire mounted on a rim, wherein a tube (5, 6, 7, 9, 10, 12), which is filed at least in part with sound-absorbing material but is overall still flexible, is mounted on the rim (1).
2. The motor vehicle wheel of claim 1, wherein the tube (5, 6, 7, 9, 10, 12) is seated on the center drop (2) of the rim (1).
3. The motor vehicle wheel of claim 1 or 2, wherein the tube (5, 6, 7, 9, 10, 12) is a rubber tube.
4. The motor vehicle wheel of one of the claims 1 to 3, wherein the tube (5, 6, 7, 9, 10, 12) fills out a part that is as large as possible, in particular up to one third, of the volume of the tire internal space and does not make contact with the inner wall of the tire during the driving operation.

5. The motor vehicle wheel of one of the claims 1 to 4, wherein the sound-absorbing material is a loose material, for example, foam flakes, foam particles, cotton, wool, foam rubber, or the like.
6. The motor vehicle wheel of one of the claims 1 to 4, wherein the sound-absorbing material is a cohesive material, for example, a foam material.
7. The motor vehicle wheel of one of the claims 1 to 6, wherein the sound-absorbing material is configured in such a way or is arranged in such a way within the tube (5, 6, 7, 9, 10, 12), that its acoustic properties change continuously or discontinuously along one of its geometric expanses.
8. The motor vehicle wheel of one of the claims 1 to 6, wherein the tube (6, 7, 9, 10, 12) is provided with a multitude of holes (6a, 7a, 9b, 12a, 12b, 12c, 12d).
9. The motor vehicle wheel of claim 8, wherein the holes (6a, 7a, 9b, 12a, 12b, 12c, 12d) are distributed regularly or irregularly in the tube (6, 7, 9, 10, 12).
10. The motor vehicle wheel of claim 8 or 9, wherein the holes (6a, 7a, 9b, 12a, 12b, 12c, 12d) have different diameters.
11. The motor vehicle wheel of one of the claims 8 to 10, wherein the tube (6, 7, 9, 10, 12) has a hole surface proportion of 5 to 80%, in particular of 10 to 50%.

12. The motor vehicle wheel of one of the claims 1 to 11, wherein in the internal space of the tube (7) provided with holes (7a) is arranged a ring (8) of sound-absorbing material, for example, of foam rubber, which rests together with the tube (7) in the center drop of the rim (1), and whose outer diameter is less than the diameter of the tube (7).

13. The motor vehicle wheel of one of the claims 1 to 12, wherein the tube (9) is provided with a multitude of naps (9a) having different heights.

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14. The motor vehicle wheel of one of the claims 1 to 13, wherein the tube (10) encases a tube element (11) of sound-absorbing material, in particular of foam material, in its internal space, and wherein this tube element (11) rests on the inner wall area of the tube (10).

15. The motor vehicle wheel of one of the claims 1 to 14, wherein the tube (12) filled with cohesive material is provided with a multitude of holes (12a, 12b, 12c, 12d), which continue as hollow spaces in the filling material.

16. The motor vehicle wheel of claim 15, wherein holes (12a) formed preferably with different diameters in the tube (12) continue in the filling material as cylindrical hollow spaces (13).

17. The motor vehicle wheel of claim 15, wherein the hollow spaces in the filling material form in particular differently dimensioned resonator hollow spaces (13), while the holes (12b) form the resonator necks in the tube (12).

18. The motor vehicle wheel of claim 15 or 17, wherein the hollow spaces (13c) in the filling material are configured with a cone shape or with a truncated cone shape.

19. The motor vehicle wheel of claim 15, wherein absorbing wedges (13d) are formed in the filling material, while the tube (12) is provided with correspondingly adapted holes (12d).

Amended Patent Claims according to Rule 86(2) EPÜ

1. A motor vehicle wheel having a tire mounted on a rim, in whose internal space is contained a device filled at least partially with sound-absorbing material, which surrounds the internal space in the form of a ring, wherein the device is a flexible tube (5, 6, 7, 9, 10, 12), which can be installed and removed together with the tire (4), and which in the installed state rests at least for the most part on the center drop (2) of the rim (1).

FIG. 1

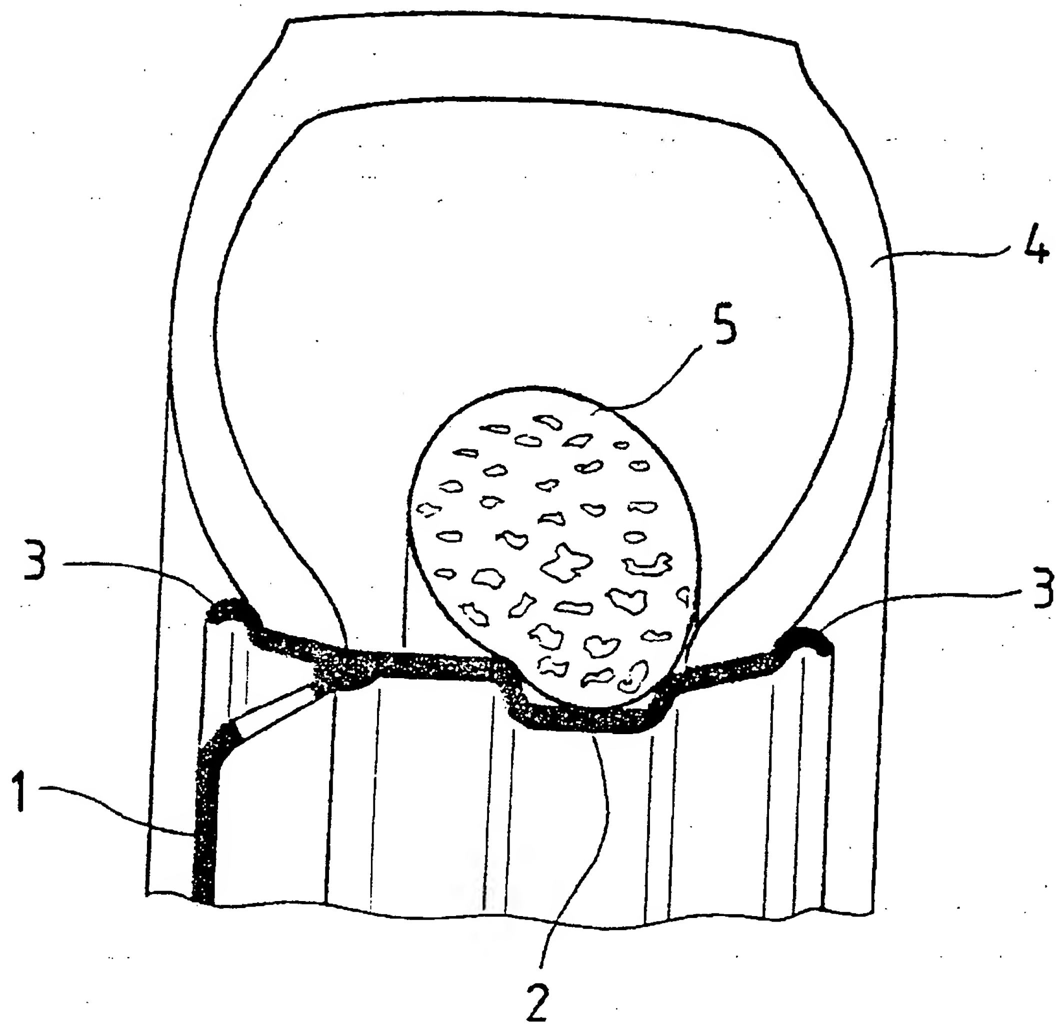


FIG. 2

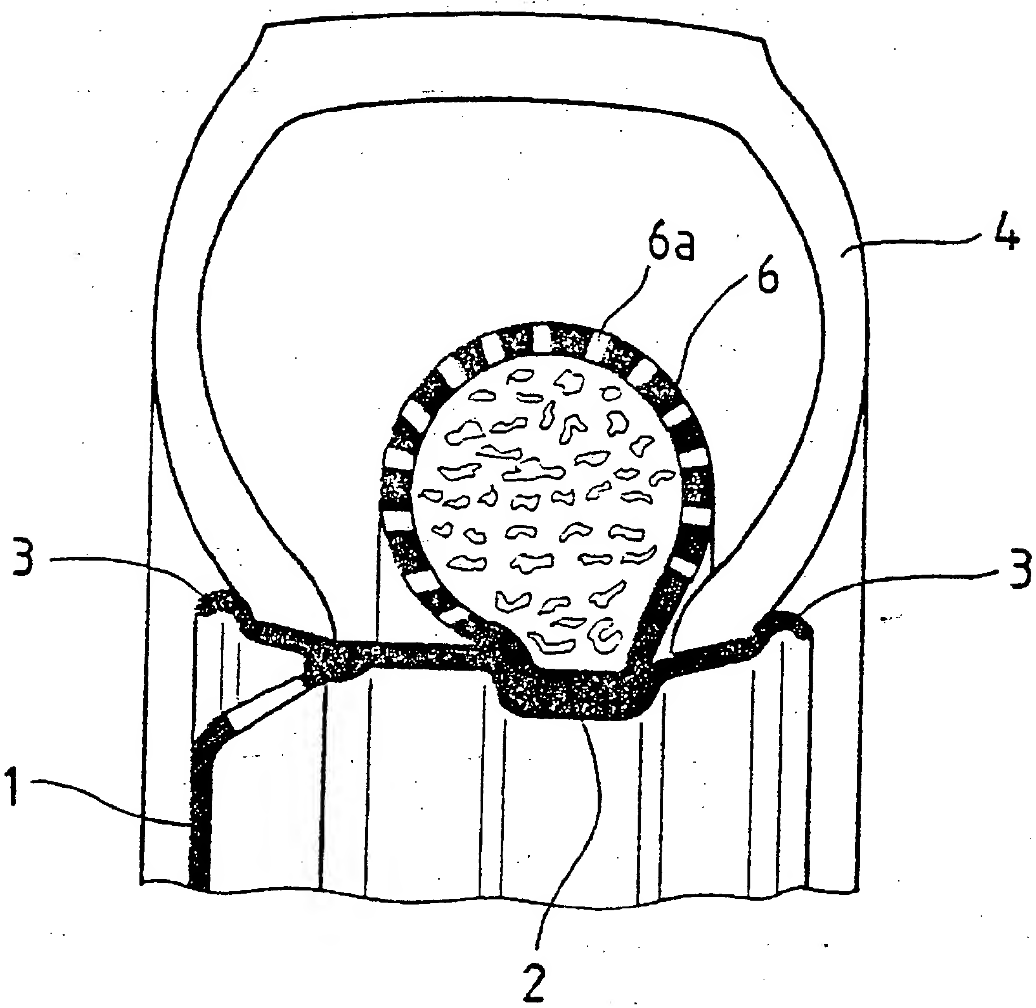


FIG. 3

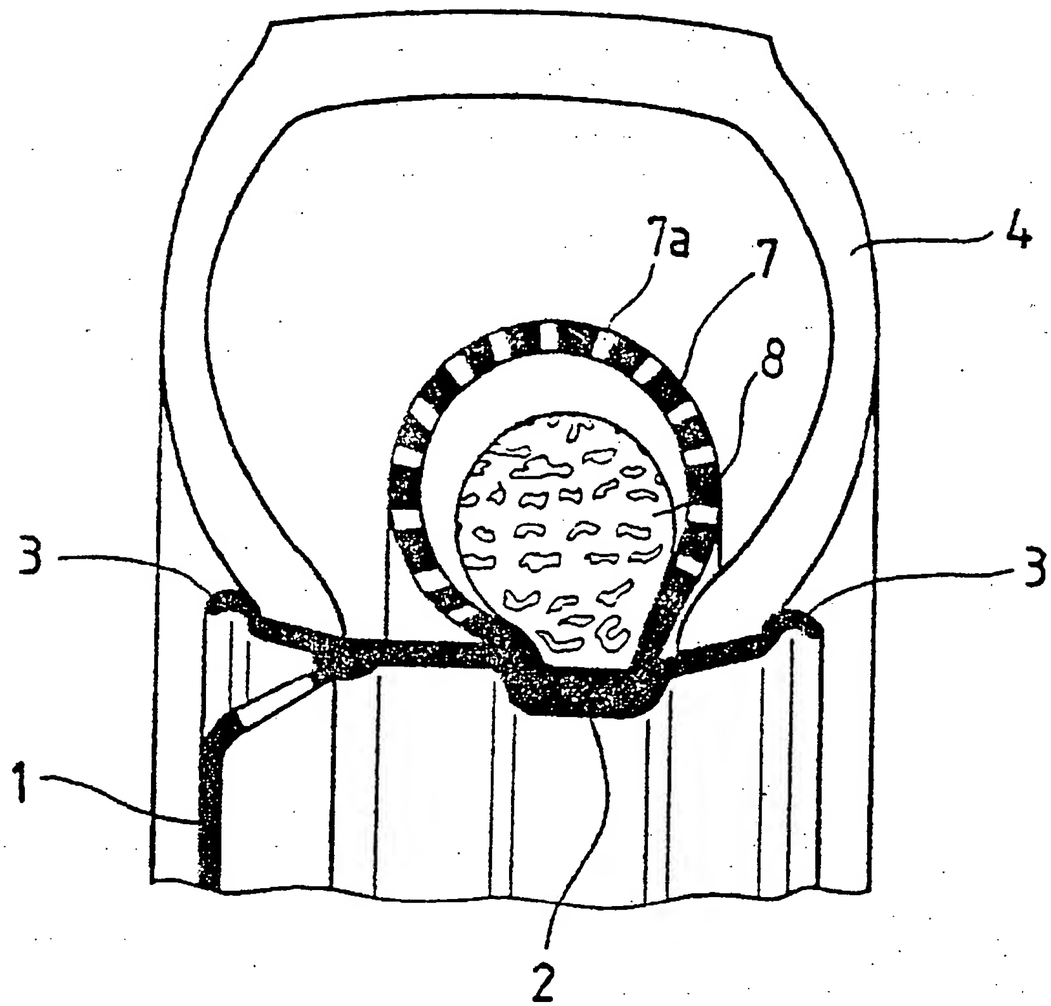


FIG. 4

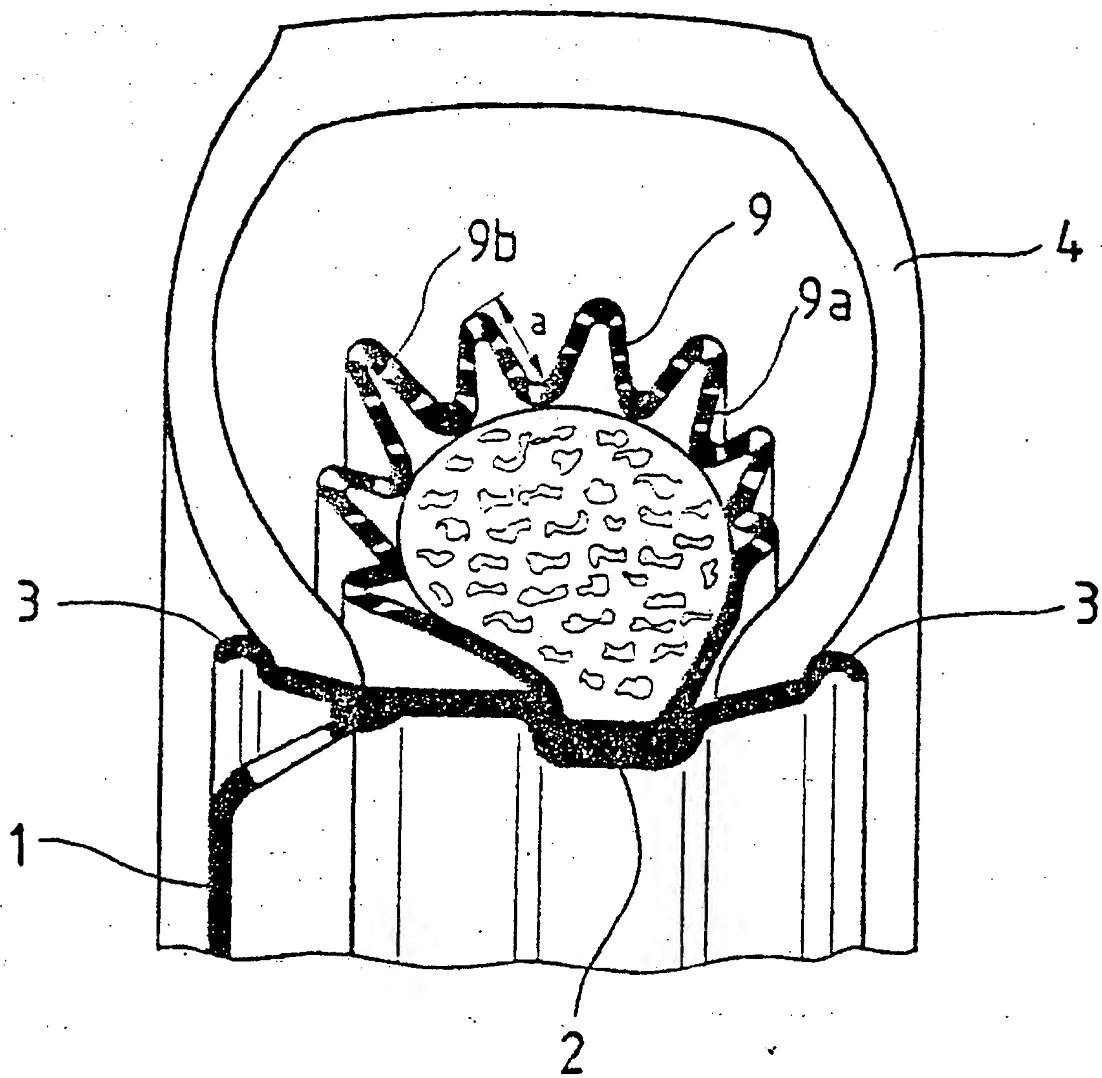


FIG.5

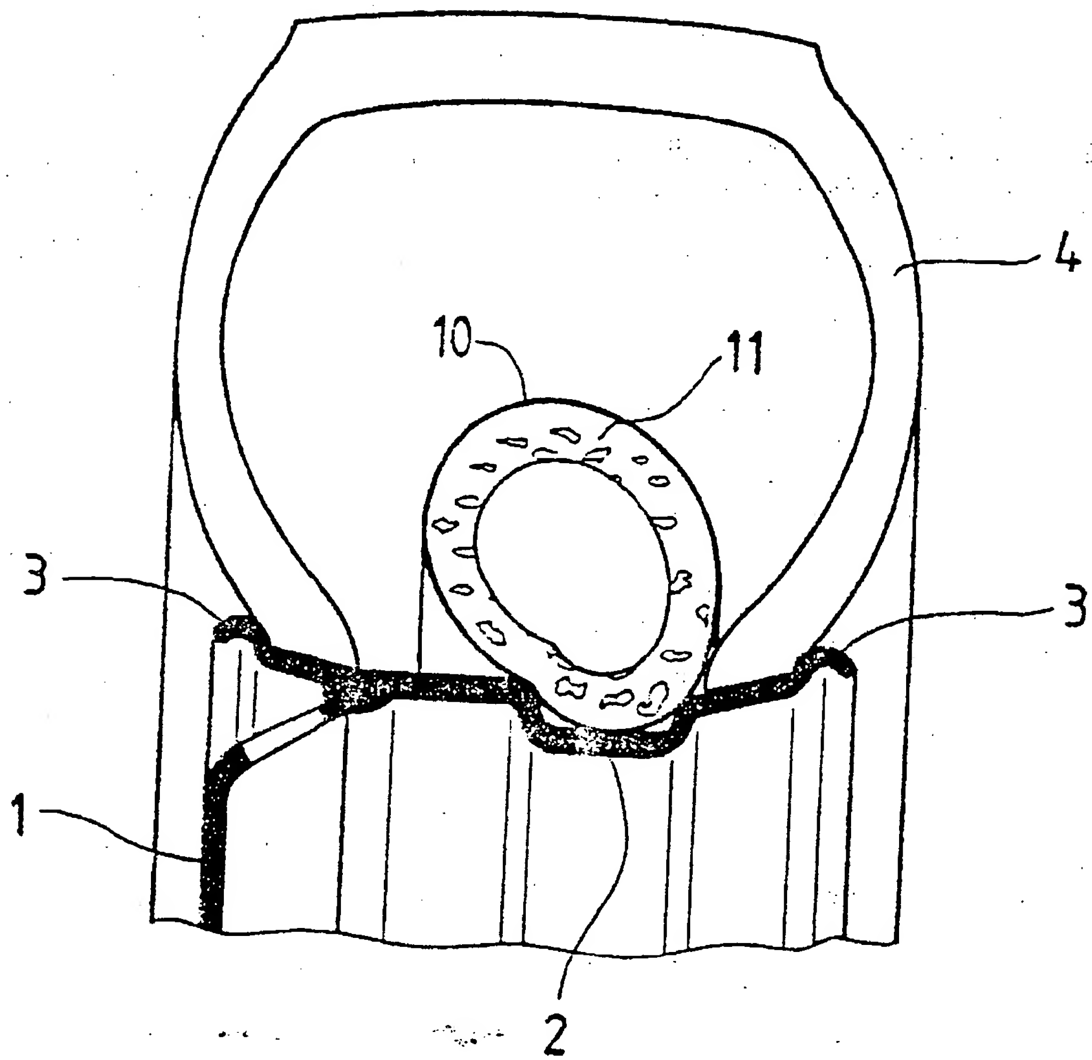


FIG. 6

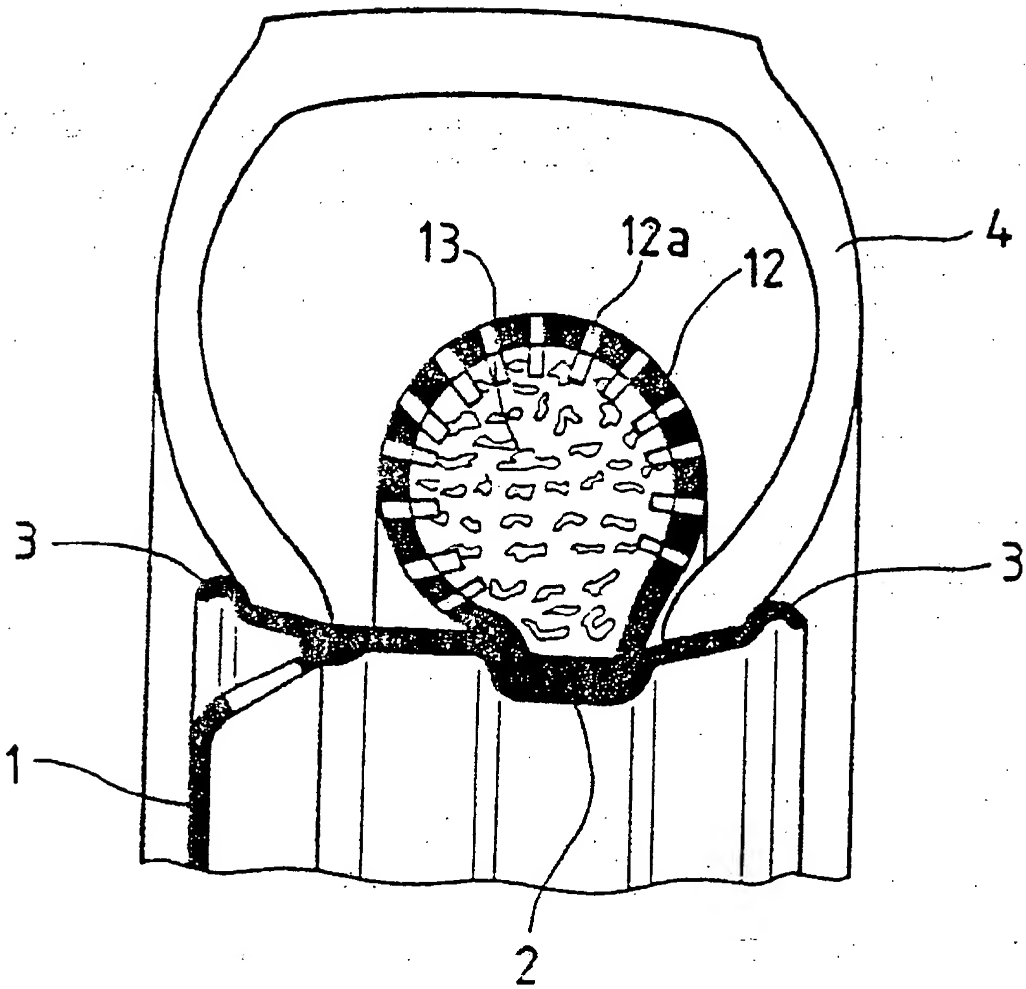


FIG. 6a

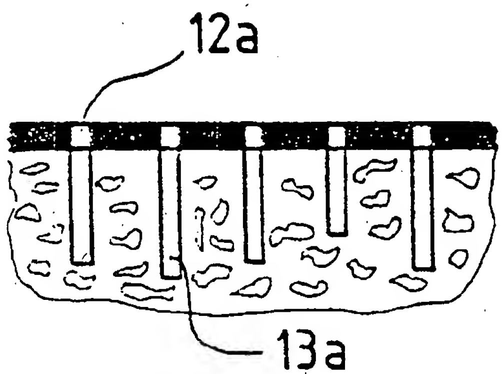


FIG. 6b

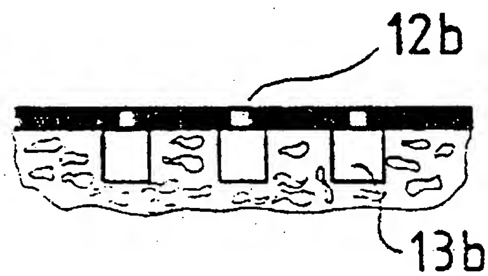


FIG. 6c

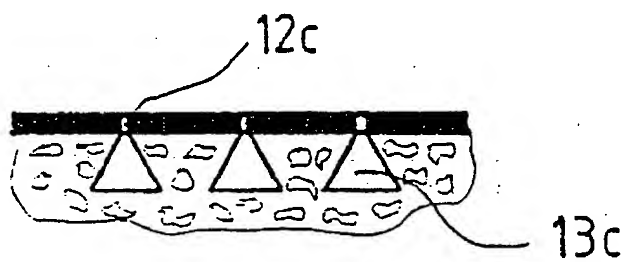


FIG. 6d

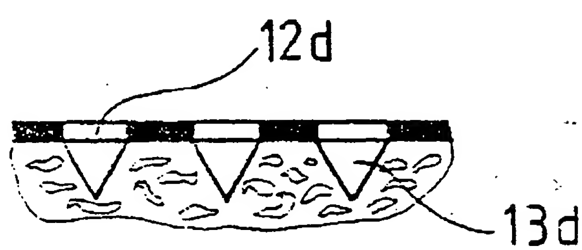
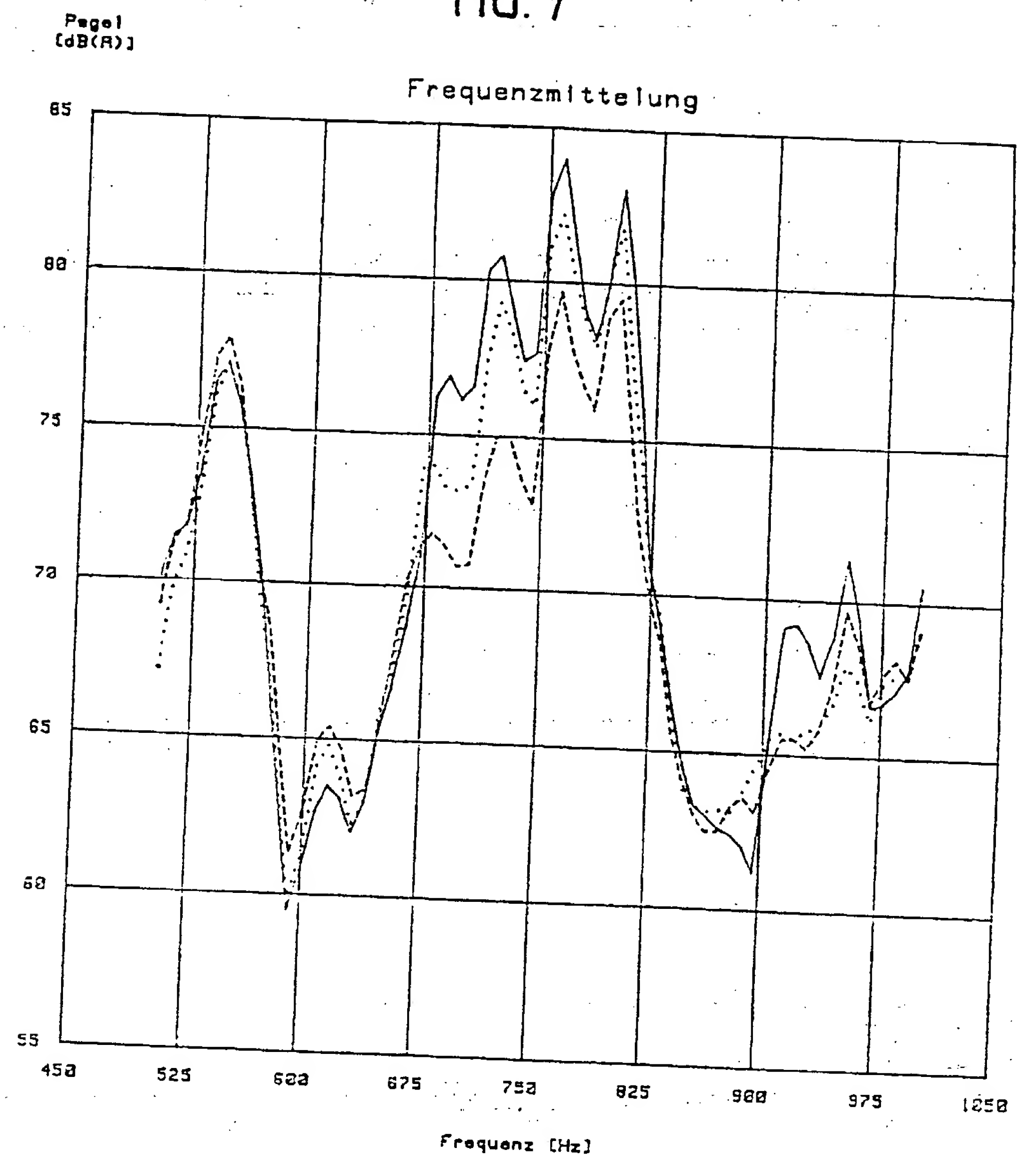


FIG. 7



ohne Schlauch

mit Schlauch gemäß FIG.1

mit Schlauch gemäß FIG.2

Legends to Fig. 7:
Frequenzmittelung = Frequency Averaging
ohne Schlauch = without tube
mit Schlauch gemäß FIG. 1 = with tube according to FIG. 1
mit Schlauch gemäß FIG. 2 = with tube according to FIG. 2

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FILMS

The use of plastic films is a recent development in the packaging industry, where the term plastic is broadly applied to the capability of being formed. Plastics are synthetic materials which can be shaped by heat or pressure in their manufacture.

Films are planar forms of plastic, thick enough to be self-supporting but thin enough to be flexed, folded, or creased without cracking. Reduction in the thickness reduces costs and increases the area obtained from a given weight of polymer (yield, m^2/kg). Film thickness depends on applications and manufacturing methods. It ranges from about 8 μm of solvent-cast polycarbonate for a capacitor film to a maximum thickness of 250 μm; in most applications it is below 125 μm. Heavier-gauge materials for glazing, blister packaging, and similar applications are usually referred to as sheets (see also SHEETING).

The use of plastic films has shown phenomenal growth during the past three decades. Numerous technical breakthroughs in polymerization and processing techniques resulted in compositions and properties designed for flexible and rigid packaging, industrial applications, and other uses. In addition, manufacturing costs were greatly reduced.

In 1984, U.S. consumption of plastic films was about 2.95×10^6 metric tons valued at >$6.3 × 10^9 (1–4). Commodity products, low density polyethylene (LDPE), and poly(vinyl chloride) (PVC) accounted for about 2.15×10^6 t; the rest are specialty films. High density polyethylene (HDPE), cast or blown, developed in 1979 for flexible packaging, is less expensive.

Specialties include the higher priced, high performance films of coated, coextruded, and laminated oriented polyester (OPET), oriented polypropylene (OPP), cellophane, oriented nylon (ON), oriented polystyrene (OPS), and vinylidene chloride copolymers (PVDC). In addition, specially designed films for high temper-

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Properties and Selection

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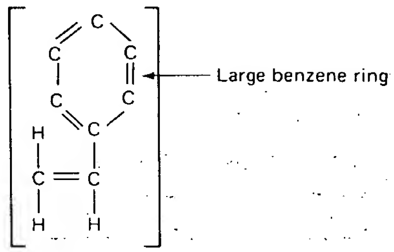

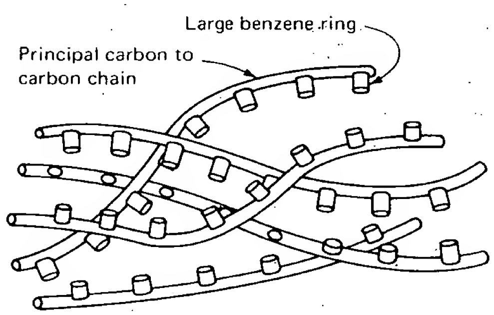

Figure 3-8 Strengthening due to chain stiffening

polymer chains can intertwine and bend around each other. The carbon-to-carbon bonds act as pivot points for chain flexure. Suppose that a polymer has a monomer that is physically large and unsymmetrical; the ability of a chain to flex will be impaired. Polystyrene, a typical example of such a system, is illustrated in Figure 3-8.

Polystyrene, the infamous "plastic toy" polymer, as would be expected by its physical structure, is a rigid and relatively brittle thermoplastic. Once again, the basic chain structure is the same as that of soft and ductile polyethylene. The presence of the large benzene ring as an integral part of the polystyrene monomer causes a reduction in chain mobility and thus an increase in rigidity.

Crystallinity

Unlike the other strengthening mechanisms, crystallization can be controlled to some degree by the fabricator. It can be induced during molding and by such things as mechanical orientation and radiation. In our discussion of the nature of polymers, the statement was made that a large percentage of polymers were amorphous in nature. That is, they do not have the neat, orderly lattice spacing of atoms, as do metals and ceramic crystals. This statement must now be qualified, since many engineering polymers, when analyzed by X-ray diffraction techniques, display significant degrees of crystallinity. In other words, not all the atoms making up a polymer chain have completely random spatial relations. A crystalline type of structure can be obtained when polymer chains tend to align, as illustrated in Figure 3-9.

There are various ways that polymer chains can orient to form crystalline polymers. The evidence of crystallinity is provided by techniques such as X-ray diffraction. A completely amorphous material such as a liquid will only produce a diffuse pattern on the diffraction film. A crystalline substance will produce spots or lines. Sharp diffraction patterns are obtained on many polymers, thus indicating crystallinity produced by ordered polymer chains. Mechanical property and dilation (size change) studies confirm that crystallinity can be produced in some polymers by slow cooling from the molten state. Sometimes polymers become crystalline in molding. The common throw-a-way polystyrene picnic knives and forks are often crystalline because the molten polymer flows into the mold down the long axis of the part. This tends to align the polymer chains. From the practical standpoint, crystallization raises the melting point, lowers the solubility in solvents, lowers impact strength, and generally improves other strength-related properties.

Plasticization

Plasticizers are lubricants that are added to polymers to improve toughness and flexibility. They usually have a negative effect on strength (Figure 3-10). Plasticizers allow the long poly-

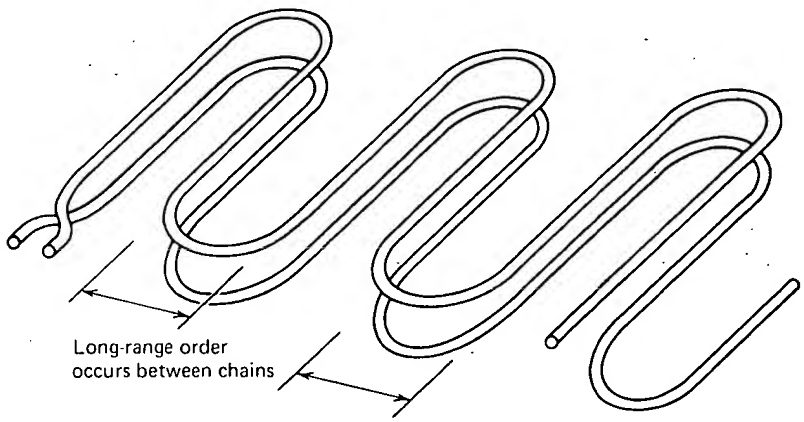

Figure 3-9 Ordered arrangement of polymer chains leading to crystallinity

mer molecules to move easier relative to each other when a strain is imposed, thus the lower tensile strength. In many cases, the materials used for plasticizers are high-boiling organic chemicals, but it is possible to obtain internal plasticization by copolymerization with other polymers. For example, chain mobility can be increased by copolymerization with a polymer having very large molecules. This has the net effect of increasing the spacing between chains, thereby performing a function similar to adding a lubricant or plasticizer. From the structural strength standpoint, plasticized polymers can be highly undesirable, since the plasticizer can age or migrate out with time, and the polymer can lose its original toughness. It is rather common to see loss of plasticizer in vinyl upholstery and in steering wheels in automobiles. On very hot days a greasy feeling often can be detected on the surface of these plastics. This is plasticizer exuding from the polymer. Most of these instances of plasticizer loss have disappeared with improved polymer technology, which has allowed internal plasticization of many polymers. In structural applications as well as most other applications, a polymer that has adequate flexibility and toughness without the use of plasticizers is always preferred.

Fillers

In the never-ending quest to improve properties of materials, many years ago it was learned that compounding other engineering materials

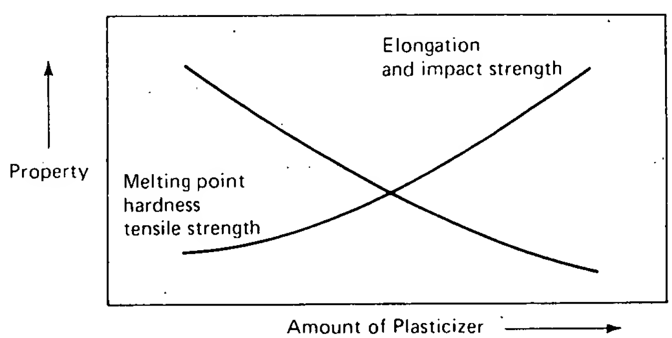

Figure 3-10 General effect of plasticizers on properties